REMARKS

This is in response to the Office Action dated June 16, 2006. In view of the foregoing amendments and following representations, reconsideration is respectfully requested.

By the above amendments, claims 1-2 and 4 have been amended. Thus, claims 1-16 are currently pending in the present application.

To facilitate the Examiner's reconsideration of the application, the specification and abstract have been reviewed and revised in order to make a number of minor clarifying and other editorial amendments. Note that the changes to the abstract are submitted in the form of a substitute abstract. Copies of the amended portions of the specification and abstract with changes marked therein are attached and entitled "*Version with Markings to Show Changes Made*."

On page 2 of the Office Action, claims 1-2 are rejected under 35 U.S.C. § 112, second paragraph. In response, claims 1-2 have been amended to provide the diameter D1 and the diameter D2 with proper antecedent basis. Accordingly, the rejection of claims 1-2 is now obviated.

Next, on pages 2-5 of the Office Action, claims 1-5, 7-12 and 14-16 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Schaming (U.S. Patent No. 4,365,758). It is submitted that the present invention, as defined in independent claims 1 and 2, clearly distingulshes over the Schaming reference for the following reasons.

Schaming discloses a descaling nozzle having a tapering venturi entrance passage, a restricted throat, and a nozzle tip having a spray orifice 33. However, as

will be demonstrated below, the Schaming reference lacks any disclosure or suggestion of the ratio (D_1/D_2) recited in independent claims 1 and 2.

Further, Schaming in col. 2, lines 24-40 states that:

"An important feature of the invention is the provision in the rear end nozzle body 12 of a central forwardly tapering conical entrance venturi water inlet passage 18 which extends longitudinally through the body 12 for a major portion of its length, such as two-thirds of its length. The forward end of the tapered passage 18 leads into a restricted short cylindrical passage or throat 19 within which the water moves at increased velocity and reduced pressure toward and through the tip of the nozzle. The throat 19 opens into a substantially enlarged screw-threaded recess 20 in the forward end of the body 12 which receives a preassembled nozzle tip unit 21 and a surrounding externally screw-threaded nozzle tip retainer sleeve 22 having a forward hexagonal head 23. As shown in. FIG. 2, the retainer sleeve 22 has threaded engagement in the recess 20 of the nozzle body 12. The retainer sleeve has a cylindrical through bore 24." (Emphasis added)

Further, col. 2, line 55 to col. 3, line 5 describe that:

"The bore of sleeve body 25 receives therein an elongated rear nozzle tip spacer sleeve 30 behind which is placed a compressible sealing washer 31 in engagement with the end face or wall 27 and being under compression. Ahead of the spacer sleeve 30 a conventional nozzle tip 32 having a spray orifice 33 rests on forward parallel retaining shoulders 34 of the sleeve body 25, the sleeve body having a cross slot 35 between these two shoulders. The nozzle tip 32 also has an arcuate cross groove 36 at its forward end whose axis is parallel to the sides of the cross slot 35. The nozzle tip 32 also has forward flat parallel faces 37 which are held against rotation by the parallel sides of the cross slot 35. As shown in FIG. 2, the retaining shoulders 34 are preferably somewhat recessed in the retaining sleeve 22 to avoid contact with outside objects which might damage the nozzle tip. The tip 32 is held firmly between retaining shoulders 34 and spacer sleeve 30 in sleeve body 25 of the nozzle tip unit 21." (Emphasis added)

Furthermore, the Schaming reference describes the role of the venturi passage in (col. 3, lines 18-28) as follows:

"Water under required pressure, such as 2000 psi, entering the nozzle body 12 must change its direction of flow 90 degrees which tends to create undesirable turbulence. This tendency is offset by the tapered venturi entrance passage 18 which

quiets turbulence and eliminates the need for a diffusing means at the nozzle inlet. The venturi passage accelerates water through the nozzle and reduces its pressure in the restricted throat 19 with the result that the well defined descaling spray impringes on the metal strip with maximum impact force to completely clean it." (Emphasis added)

In describing the objects of the Schaming descaling nozzle, col. 1, lines 18-36 describe that:

"More particularly, it is a prime object of the invention to provide a descaling nozzle of greater simplicity and easier installation which will deliver onto the metal strip a descaling spray of higher energy and better definition without turbulence. This objective is accomplished by providing a venturi-type nozzle entrance passage which quiets turbulence and increases water velocity through the nozzle tip.

Another objective is to eliminate the need for dirt screens and water diffusers at the inlet of the nozzle in order to prevent dirt clogging and reduced turbulence. This objective is accomplished primarily by burying or recessing the nozzle body deeply in the supply header so that dirt within the header will settle well below the nozzle inlet and will tend not to be drawn into the nozzle at start-up. Another benefit over the prior art achieved by the deep burying of the nozzle in the header is greatly reduced damage to projecting nozzle tips through collision with the hot steel strip or other impact." (Emphasis added)

Note that the Schaming reference corresponds to the prior art nozzle described on page 4, line 24 to page 5, line14 and comparative Example 5 described on pages 39-40 of the present specification.

A review of the Schaming reference indicates that Figs. 2 and 4 are drawn to the same scale, and thus, when D_1 (an inner diameter of the cylindrical passage or throat 19) and D2 (a minor diameter of the spray orifice 33) are measured based on Figs. 2 and 4, D1 is about 6.7mm and D2 is about 3.9mm. Thus, the ratio of D_1/D_2 is 6.7/3.9=1.7 in Schaming, which is a value that is significantly lower than 3. Independent claim 1 expressly requires that the ratio (D_1/D_2) of the inner diameter D_1 of the large-diameter segment relative to the

minor diameter D_2 of said discharge orifice is not less than 3. Also, claim 2 requires that ratio D_1/D_2 is not less than 3 and is less than 7. Thus, the Schaming reference does not meet each and every limitation of claims 1-2.

Further, the significance of the ratio $D_1/D2$ is not disclosed or remotely suggested by the Schaming reference. As described above, the important feature of the Schaming nozzle resides in the tapering conical entrance venturi passage 18. Therefore, the specific ratio required in claims 1-2 would not have been obvious in view of the teaching of Schaming. Furthermore, one of ordinary skill in the art would not have been motivated to re-dimension the discharge opening and the inner diameter segment 30 of Schaming to result in the arrangement defined in claims 1-2.

According to the present invention, unexpected advantages are obtained. As mentioned above, the applied reference corresponds to Comparative Example 5 of the present specification, in which the aluminum erosion amount was 0.007g (see Comparative Example 5 of the present specification). In contrast, Example 1 produced an aluminum erosion amount of 0.013g, approximately twice the erosion amount of Comparative Example 5. With the claimed arrangement, uniform collisional force distribution, and efficient scale removal (improved descaling performance) can be realized even at a low pressure and/or a low flow rate. These effects could not have been foreseen based on the teachings of the Schaming reference.

In the rejection, the Examiner takes the position that claimed ratio is simply a

result of discovering optimum values based on a result effective variable. However, as instructed in MPEP 2144.05(II)(B), a particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result. Clearly, the Schaming reference does not recognize that the advantages achieved with the claimed invention are a function of the ratio of the inner diameter D_1 of the large-diameter segment relative to the minor diameter D_2 of the discharge orifice. Thus, the specific ratio required in claims 1-2 cannot simply be dismissed as a determination of optimum dimensions. Should the Examiner maintain the rejection, then the Examiner is requested to point out the support for the position that the claimed ratio is "recognized" as a result-effective variable. Note in the case cited by the Examiner, the court found that the prior art suggested proportional balancing to achieve desired results in the formation of an alloy. There is no recognition of the significance of the ratio D_1/D_2 in Schaming.

In view of the above, it is submitted that the present application is now clearly in condition for allowance. The Examiner therefore is requested to pass this case to issue.

In the event that the Examiner has any comments or suggestions of a nature necessary to place this case in condition for allowance, then the Examiner is requested to contact Applicant's undersigned attorney by telephone to promptly resolve any remaining matters.

Respectfully submitted,

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